

CLAIMS

1. A process for the alcoholysis of acid oils of vegetable or animal origin which, with C1 to C5 mono alcohols, can transesterify vegetable or animal oils with a natural free acidity and simultaneously esterify their free acidity, characterized in that it comprises two catalysis steps in two reactors functioning with a heterogeneous fixed bed catalyst.
2. A process according to claim 1, characterized in that it comprises:
 - a catalytic reaction step a) in which an aliquot quantity of oil and the monoalcohol are simultaneously introduced into said first reactor, pre-heated to a temperature in the range 180°C to 210°C and at an operating pressure in the range 4 to 6 MPa;
 - a step b) in which the reaction mixture leaving the first catalysis reactor undergoes complete or partial evaporation of the excess mono-, encouraging separation of the glycerol formed, which is recovered;
 - a step c) in which the ester mixture is introduced into the second reactor with addition of the equivalent by weight of monoalcohol;
 - a step d) in which the mixture from step c) undergoes complete evaporation of the excess monoalcohol, then the residual glycerol formed is eliminated.
3. A process according to claim 1 or claim 2, characterized in that the catalyst used in steps a) and c) comprises a zinc aluminate mixed oxide and with formula $\text{ZnAl}_2\text{O}_4, x\text{ZnO}, y\text{Al}_2\text{O}_3$, in which x and y each represent a number in the range 0 to 2.
4. A process according to claim 3, characterized in that the zinc aluminate of the catalyst is of the spinel type.

5. A process according to claims 1 to 4, characterized in that the two reactors are substantially identical in size and step c) is carried out under the catalysis conditions of the first catalysis step a).
6. A process according to one of claims 1 to 5, characterized in that the starting oil
5 is selected from unrefined, naturally fatty acid-rich degummed rapeseed, soya and sunflower oil.
7. A process according to one of claims 1 to 6, characterized in that the starting oil is selected from naturally fatty acid-rich exotic African palm, palm nut oil and coconut oil.
- 10 8. A process according to one of claims 1 to 7, characterized in that an unrefined acid oil freed of its phospholipids and/or gums and with an acid number between 0.5 and 20 is used.
9. A process according to claim 8, characterized in that the acid number is between 1 and 15.
- 15 10. A process according to claim 8, characterized in that the acid number is between 2 and 12.
11. A process according to claim 9 or claim 10, characterized in that the oil results from pressure and/or extraction and has undergone a degumming step to obtain a residual phosphorous content of less than 10 ppm followed by a drying step to
20 obtain a residual water content of less than 500 ppm.
12. A process according to one of claims 1 to 11, characterized in that the mono alcohol is methanol.